REMARKS

Claims 1, 3 – 6, 8, 10 – 21, 23 - 24, and 27 - 32 are pending in the present Application.

Reconsideration and allowance of the claims are respectfully requested in view of the following remarks.

Claim Rejections Under 35 U.S.C. § 103(a)

Claims 1, 3 – 6, and 15 – 17 stand rejected under 35 U.S.C. § 103(a), as allegedly unpatentable over U.S. Patent Application Publication 2002/0048691 to Davis et al. ("Davis"), in view of Rosato's Injection Molding Handbook (3rd ed) ("Rosato"), in view of JP 10-306268 to Toshihiko et al. ("Toshihiko"), and further in view of U.S. Patent No. 5,145,877 to Bopp et al. ("Bopp"). Applicants respectfully traverse this rejection.

Davis is cited for "injection molding a polymeric mixture of polystyrene and polyphenylene ether…wherein an injection molded radial disk exhibits a radial tilt change of less than or equal to 0.35." (8/10/07 Office Action, page 2)

Rosato is cited for teaching "carry[ing] out a molding process using a clamp tonnage of about 12 to about 35 tons to form the article". (8/10/07 Office Action, page 2)

Toshihiko is cited for measuring radial tilt after 96 hours at 80°C. (8/10/07 Office Action, page 2)

Bopp is cited for allegedly teaching "injection molding of polyphenylene oxide…and polystyrene…wherein the material melt temperature is 328C and the mold temperature is 135C (Column 8, lines 23-44)." (8/10/07 Office Action, page 2) The Applicants respectfully disagree with the Examiner's reading of Bopp. Turning to Column 8, lines 23-44, Bopp discloses melt compounding polyphenylene oxide and recycled polystyrene in a twin screw extruder having a melt temperature at the die of about 328°C and pelletizing the blend. The resulting micropellets were then imbibed with blowing agent using the following process:

> The resulting "micropellets" were then imbibed with a blowing agent. More particularly, 75 g of the micropellets were sieved through a No. 16 screen (14 mesh) and charged into a 300 ml reactor containing 150 ml deionized water, 1.2 g polyvinyl alcohol, and 9.6 g n-pentane. The reactor was sealed and the contents were agitated at approximately 800 rpm. The reactor was then heated to 95° C., maintained at this temperature for 1 hour, heated to 135° C. and maintained at this temperature for 4 hours. The reactor was then cooled to room temperature. As a result of this process, the substantially cylindrical micropellets were transformed to substantially spherical

> imbibed beads. The imbibed beads were then washed with tap water, dried under ambient conditions and screened.

(Bopp, column 8, lines 34-44) The process of imbibing the micropellets with a blowing agent is not a molding process and thus, the temperature of 135° C is not a molding temperature. No mold is used in the Bopp process and the micropellets are not molded into an article. Still further, the method disclosed in Column 8, lines 23-44 of Bopp does not show injection molding, let alone molding. A review of the Bopp reference reveals that no injection molding temperature is disclosed at all. Clamp tonnage for injection molding is also not taught or suggested.

Independent claim 1 is directed to a method of molding a disk, which requires injection molding a poly(arylene ether) and poly(alkenyl aromatic) material under specific conditions to result in molded disks having specific properties achievable due to the molding conditions used. Particularly, the conditions require a melt temperature of about 330 to about 370°C, a mold temperature of about 90 to about 130°C, and a clamp tonnage of about 12 to about 35 tons. Independent claim 17 is a similar method wherein the polymeric material comprises poly(2,6-dimethyl-1,4-phenylene oxide) and polystyrene. Such molding conditions were developed by the inventors to obtain a disk percent feature replication of greater than or equal to about 90 percent, and furthermore to provide a disk assembly fabricated from the disk which exhibit a radial tilt change value after 96 hours at 80°C of less than or equal to about 0.35 degree measured at a radius of 55 millimeters. Such stringent requirements for the disk properties were only achievable after research and recognition that molding conditions play an important role in the physical properties of the resulting molded article.

For an obviousness rejection to be proper, the Examiner must meet the burden of establishing a *prima facie* case of obviousness, i.e., that all elements of the invention are disclosed in the prior art. *In re Fine*, 5 U.S.P.Q.2d 1596, 1598 (Fed. Cir. 1988); *In Re Wilson*, 165 U.S.P.Q. 494, 496 (C.C.P.A. 1970); *Amgen v. Chugai Pharmaceuticals Co.*, 927 U.S.P.Q.2d, 1016, 1023 (Fed. Cir. 1996).

It is the Applicants' contention that Davis in view of Rosato, Toshihiko, and further in view of Bopp fail to render obvious independent claims 1 and 17.

First, none of the references teach each and every claim limitation required by these claims. Specifically, the injected molded material is the combination of poly(arylene ether) and poly(alkenyl

aromatic) or poly(2,6-dimethyl-1,4-phenylene oxide) and polystyrene. None of the references teach the required molding temperature and clamp tonnage.

Davis fails to teach or suggest the required injection molding parameters for the claimed polymeric material. Davis does not teach an injection mold temperature, a melt temperature, or clamp tonnage. Davis generally fails to teach or suggest how molding parameters can affect the resulting disk properties of feature replication and radial tilt change. It has been found by the present Applicants what specific injection molding parameters are required in order to obtain disks meeting specific physical properties. Although Davis teaches the preference of low disk tilt, it does not suggest to one of ordinary skill in the art how molding parameters affect this property or how to choose the particular molding conditions to achieve low radial tilt.

Rosato fails to teach the missing limitation of a mold temperature of about 90 to about 130°C and a clamp tonnage of about 12 to about 35 tons required to mold the combination of poly(arylene ether) and poly(alkenyl aromatic) or poly(2,6-dimethyl-1,4-phenylene oxide) and polystyrene of claims 1 and 17.

The molding conditions taught by Rosato are not directed to the specific material claimed. As indicated by Rosato itself, the conditions for molding are markedly variable depending upon the material being molded:

> Depending on what plastic is being molded, the IMM clamping force may be from less than 20 tons to thousands of tons. The different plastics require different pressures applied on their melt in the mold cavity, ranging from 2000 to 30,000 psi (14 to 207 MPa).

(Rosato, page 60) Furthermore, the mold temperature for unreinforced articles in Table 4-8 also ranges from a low of 25°C (PE) to a high of 230°C (PAI). Such a diverse range of conditions does not teach or suggest the specific molding parameters required in claims 1 and 17.

Additionallly, the teaching in Rosato actually teaches *away* from the molding conditions required by claims 1 and 17. Specifically, the claims require the poly(arylene ether), or poly(2,6-dimethyl-1,4-phenylene oxide), and poly(alkenyl aromatic) material to be injection molded with a melt temperature of about 330 to about 370°C and a mold temperature of about 90 to about 130°C. According to Table 4-8 of Rosato, the average melt temperature of polystyrene and polyphenylene oxide is 100°C and 120°C, respectively. Thus, one of ordinary skill in the art would look to using melt temperatures for a poly(arylene ether) and poly(alkenyl aromatic) material of around 100°C and 120°C, a temperature range *significantly* lower than what is required by claims 1 and 17. Indeed, the

difference between Rosato's suggested melt temperature and the claimed range of about 330 to about 370°C *differs by a factor of three.*

Also, the suggested mold temperature of Rosato for polystyrene and polyphenylene oxide is 45°C and 80°C, respectively. (Rosato, Table 4-8) Thus, one of ordinary skill in the art would look to using mold temperatures for a poly(arylene ether) and poly(alkenyl aromatic) material of around 45°C and 80°C, a temperature range which again is much lower than what is required by claims 1 and 17. Thus, one of ordinary skill in the art would look to Rosato for a teaching or a suggestion of how to injection mold a poly(arylene ether) and poly(alkenyl aromatic) material and would fail to result in the conditions required by claims 1 and 17 as both the melt and the mold temperature of Rosato is simply too low.

Finally, guidance by Rosato regarding what clamp tonnage to use in injection molding a poly(arylene ether) and poly(alkenyl aromatic) material to form a disk having specific properties cannot be found. Rosato fails to teach or suggest the required range of clamp tonnage of 12 to about 35 tons. Rosato's teaching of the wide range of potential clamp tonnage (less than 20 tons to thousands of tons, page 60) is simply too variable to lead one of ordinary skill in the art to choose the particular range required by claims 1 and 17.

Similarly, Toshihiko also fails to teach or suggest the required molding parameters for a poly(arylene ether) and poly(alkenyl aromatic) or poly(2,6-dimethyl-1,4-phenylene oxide) and polystyrene material required by claims 1 and 17. The reference also does not inform one of ordinary skill in the art how molding parameters can affect the resulting disk properties of feature replication and radial tilt change.

Finally, Bopp as discussed above fails to teach or suggest the required mold temperature and clamp tonnage in an injection molding process.

As independent claims 1 and 17 require specific injection molding conditions in order to obtain poly(arylene ether) and poly(alkenyl aromatic) or poly(2,6-dimethyl-1,4-phenylene oxide) and polystyrene disks having specific feature replication and radial tilt values when prepared into disk assemblies, the cited references fail to teach or suggest each and every claim limitation of the claims. Reconsideration and removal of the § 103(a) rejections over independent claims 1 and 17 are respectfully requested since the cited art fails to teach or suggest the combination of elements

organized in the manner found in the claims. As claims 3-6 and 15-16 ultimately depend from claim 1, they too have not been rendered obvious.

Claims 10 and 14 stand rejected under 35 U.S.C. § 103(a), as allegedly unpatentable over Davis, Rosato, Bopp, and Toshihiko, in view of U.S. Patent Application Publication 2002/0137840 to Adedeji et al ("Adedeji"). Applicants respectfully traverse this rejection.

Adedeji is cited for its teaching of polyarylene ether and polyalkenyl aromatic. (8/10/07 Office Action, pages 6-7) The Examiner states that "[i]t would have been prima facie obvious to one of ordinary skill in the art at the time the invention was made to use Adedji's specific polymeric structure in Davis' molding process." (8/10/07 Office Action, pages 6-7)

Claims 10 and 14 depend from independent claim 1 discussed above. As mentioned previously, Davis, Rosato, Toshihiko, and Bopp fail to teach or suggest injection molding a poly(arylene ether) and poly(alkenyl aromatic) material according to the required molding conditions of mold temperature and clamp tonnage required by claim 1.

Adedeji does disclose a thermoplastic containing poly(arylene ether) and a homopolymer of an alkenyl aromatic monomer (Abstract). However, Adedeji does not teach or suggest the mold temperature of claim 1, but rather a much lower temperature. (Adedeji, [0089]-[0090]) Indeed, the disclosed mold temperature of Adedeji (100-120°F = 38-49°C) is more in line with what is suggested in Rosato than what is required by the instant claims. (Adedeji, [0090])

Reconsideration and removal of the § 103(a) rejections over claims 10 and 14 are respectfully requested since the cited art fails to teach or suggest the combination of elements organized in the manner found in the claims.

Claim 11 stands rejected under 35 U.S.C. § 103(a), as allegedly unpatentable over Davis, Rosato, Bopp, Toshihiko, and further in view of U.S. Patent No. 6,306,953 to Fortuyn et al ("Fortuyn"). Applicants respectfully traverse this rejection.

Fortuyn is cited for disclosing a "polyarylene ether ha[ving] an intrinsic viscosity of about 0.10 to about 0.60 deciliters per gram as measured in chloroform at 25°C." (8/10/07 Office Action, page 7)

Claim 11 depends from independent claim 1 discussed above. As mentioned, Davis, Rosato, Toshihiko, and Bopp fail to teach or suggest each and every limitation of claim 1. Fortuyn does not provide the missing teaching. Fortuyn does disclose injection molding at about 250 to 320° C, but provides no guidance as to mold temperature or clamp tonnage. As each and every limitation of claim 1 is not taught or suggested by the references, claim 1 and dependent claim 11 have not been rendered obvious. Reconsideration and removal of the rejection are respectfully requested.

Claim 12 stands rejected under 35 U.S.C. § 103(a), as allegedly unpatentable over Davis, Rosato, Bopp, Toshihiko, and further in view of U.S. Patent No. 4,727,093 to Allen ("Allen"). Applicants respectfully traverse this rejection.

Allen is cited for "the polyalkenyl aromatic contains at least 25% by weight of the claimed structural units (see claim listing). (8/10/07 Office Action, page 7)

Claim 12 depends from independent claim 1 discussed above. As mentioned, Davis, Rosato, Toshihiko, and Bopp fail to teach or suggest each and every limitation of claim 1. Allen does not provide the missing teaching. Particularly, Allen does not teach any injection molding parameters at all let alone mold temperature and clamp tonnage. As each and every limitation of claim 1 is not taught or suggested by the references, claim 1 and dependent claim 12 have not been rendered obvious. Reconsideration and removal of the rejection are respectfully requested.

Claim 13 stands rejected under 35 U.S.C. § 103(a), as allegedly unpatentable over Davis, Rosato, Bopp, Toshihiko, and further in view of U.S. Patent No. 5,872,201 to Cheung et al ("Cheung"). Applicants respectfully traverse this rejection.

Cheung is cited for atactic crystal polystyrene. (8/10/07 Office Action, page 11) Cheung does not disclose specific injection molding parameters or disk assembly dimensional stability.

Claim 13 depends from independent claim 1 discussed above. As mentioned, Davis, Rosato, Toshihiko, and Bopp fail to teach or suggest each and every limitation of claim 1. Cheung does not provide the missing teaching. Particularly, Cheung does not teach any injection molding parameters at all. As each and every limitation of claim 1 is not taught or suggested by the references, claim 1 and dependent claim 13 have not been rendered obvious. Reconsideration and removal of the rejection are respectfully requested.

Claims 18 – 20, 23, 24, and 31 – 32 stand rejected under 35 U.S.C. § 103(a), as allegedly unpatentable over Davis, Rosato, Toshihiko, and Bopp, further in view of U.S. Patent No. 5,525,645 to Ohkawa et al ("Ohkawa"). Applicants respectfully traverse this rejection.

Ohkawa is cited for "testing the disks for percent feature replication; creating an updated molding model based on the mold parameter values that resulted in disks exhibiting a percent feature replication within a selected range of values; and repeating the molding, testing and creating steps until the final disks exhibit a percent feature replication of greater than or equal to about 90 percent (Column 12, lines 66-67; Column 13, lines 1-11, 45-67; Column 14, lines 1-2)." (8/10/07 Office Action, page 5) It is noted that Ohkawa does not teach or suggest injection molding at all. Rather, Ohkawa teaches optical molding. (Ohkawa, Abstract)

Independent claim 18 is directed to a method of molding a disk, which requires injection molding a poly(arylene ether) and poly(alkenyl aromatic) material to form disks according to a molding model to achieve molded disks having specific properties of feature replication and radial tilt change when prepared into disk assemblies.

Claims 19 – 20, 23, 24, and 31 – 32 all ultimately depend from independent claim 18. Claim 18 is not obvious over Davis, Rosato, Toshihiko, Bopp and Ohkawa as the references fail to teach or suggest injection molding according to a multi-step molding model comprising certain parameters, testing the resulting disks, updating the molding model, and repeating until the molding parameters of the resulting molding model results in the fabrication of disk assemblies exhibiting a radial tilt change value after aging of less than or equal to about 0.35 degree measured at a radius of 55 millimeters and a percent feature replication of greater than or equal to about 90 percent. As discussed above, none of Davis, Rosato, Toshihiko, or Bopp teach or suggest the importance of molding conditions on the claimed properties of the resulting disk or disk assemblies. Ohkawa fails to cure the deficiencies of Davis, Rosato, Toshihiko, and Bopp as Ohkawa does not even teach or suggest injection molding. Thus, based on the teachings of Davis, Rosato, Toshihiko, Bopp, and Ohkawa, one of ordinary skill in the art would not even look to molding parameters as the means to obtain a disk assembly having particular physical properties such as reduced radial tilt as neither of these references teach or suggest the importance of the injection molding parameters to the disk properties such as dimensional stability.

Accordingly, Applicants respectfully request withdrawal of the 35 U.S.C. §103(a) rejections over claims 18 – 20, 23, 24, and 31 – 32.

Claim 27 stands rejected under 35 U.S.C. § 103(a), as allegedly unpatentable over Davis, Rosato, Bopp, Toshihiko, and Ohkawa, and further in view of U.S. Patent No. 6,407,200 to Singh et al ("Singh"). Applicants respectfully traverse this rejection.

Singh is generally directed to a method of preparing a poly(arylene ether). Singh does not teach injection molding parameters or radial stability parameters of disk assemblies or feature replication.

Claim 27 depends from claim 18. As discussed above, Davis, Rosato, Toshihiko, Bopp, and Ohkawa fail to render obvious independent claim 18. Singh also fails to teach or suggest a multi-step method of molding disks or the required radial tilt value or feature replication. Based on the teachings of Davis, Rosato, Toshihiko, Bopp, Ohkawa, and Singh, one of ordinary skill in the art would not even look to molding parameters as the means to obtain a disk assembly having reduced radial tilt and/or improved feature replication as none of these references teach or suggest the importance of these parameters to final disk properties such as dimensional stability. Accordingly, Applicants respectfully request withdrawal of the 35 U.S.C. §103(a) rejection over claim 27.

Claim 28 stands rejected under 35 U.S.C. § 103(a), as allegedly unpatentable over Davis, Rosato, Bopp, Toshihiko, and Ohkawa, and further in view of Fortuyn. Applicants respectfully traverse this rejection.

Claim 28 depends from claim 18. As discussed above, Davis, Rosato, Toshihiko, Bopp, and Ohkawa fail to render obvious independent claim 18. Fortuyn also fails to teach or suggest a multi-step method of molding disks or the required radial tilt value or feature replication. Based on the teachings of Davis, Rosato, Toshihiko, Bopp, Ohkawa, and Fortuyn, one of ordinary skill in the art would not even look to molding parameters as the means to obtain a disk assembly having reduced radial tilt and/or improved feature replication as none of these references teach or suggest the importance of these parameters to final disk properties such as dimensional stability. Accordingly, Applicants respectfully request withdrawal of the 35 U.S.C. §103(a) rejection over claim 28.

Claim 29 stands rejected under 35 U.S.C. § 103(a), as allegedly unpatentable over Davis, Rosato, Bopp,. Toshihiko, and Ohkawa, and further in view of Allen. Applicants respectfully traverse this rejection.

Claim 29 depends from claim 18. As discussed above, Davis, Rosato, Toshihiko, Bopp, and Ohkawa fail to render obvious independent claim 18. Allen also fails to teach or suggest a multi-step method of molding disks or the required radial tilt value or feature replication. Based on the teachings of Davis, Rosato, Toshihiko, Bopp, Ohkawa, and Allen, one of ordinary skill in the art would not even look to molding parameters as the means to obtain a disk assembly having reduced radial tilt and/or improved feature replication as none of these references teach or suggest the importance of these parameters to final disk properties. Accordingly, Applicants respectfully request withdrawal of the 35 U.S.C. §103(a) rejection over claim 29.

Claim 30 stands rejected under 35 U.S.C. § 103(a), as allegedly unpatentable over Davis, Rosato, Bopp, Toshihiko, and Ohkawa, and further in view of Adedeji. Applicants respectfully traverse this rejection.

Claim 30 depends from claim 18. As discussed above, Davis, Rosato, Toshihiko, Bopp, and Ohkawa fail to render obvious independent claim 18. Adedeji also fails to teach or suggest a multi-step method of molding disks or the required radial tilt value or feature replication. Based on the teachings of Davis, Rosato, Toshihiko, Bopp, Ohkawa, and Adedeji, one of ordinary skill in the art would not even look to molding parameters as the means to obtain a disk assembly having reduced radial tilt and/or improved feature replication as none of these references teach or suggest the importance of these parameters to final disk properties. Accordingly, Applicants respectfully request withdrawal of the 35 U.S.C. §103(a) rejection over claim 30.

It is believed that the foregoing remarks fully comply with the Office Action and that the claims herein should now be allowable to Applicants. Accordingly, reconsideration and withdrawal of the objection(s) and rejection(s) and allowance of the case are respectfully requested.

If there are any additional charges with respect to this Response or otherwise, please charge them to Deposit Account No. 50-1131.

Respectfully submitted,

CANTOR COLBURN LLP

By 

Roberta L. Pelletier
Registration No. 46,372

Date: November 9, 2007
CANTOR COLBURN LLP
55 Griffin Road South
Bloomfield, CT 06002
Telephone (860) 286-2929
Facsimile (860) 286-0115
Customer No.: 23413